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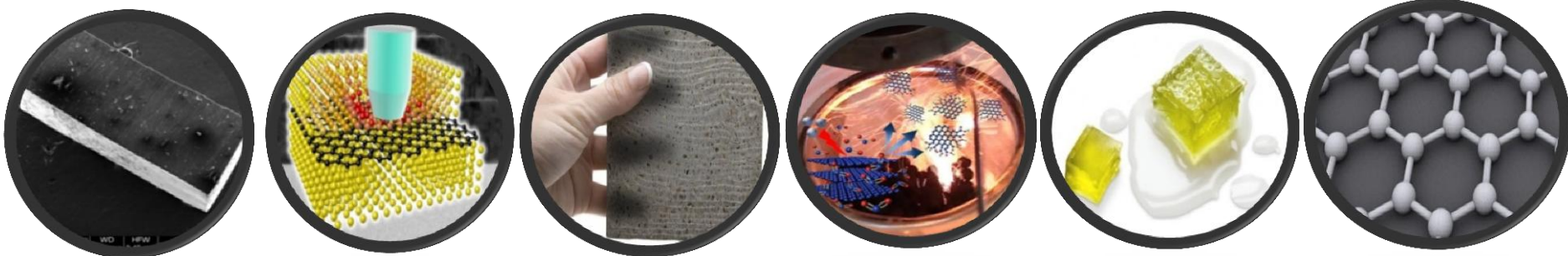
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# 신소재 & 재료공학...??

- 재료의 조성, 구조 및 가공과 재료의 성질, 용도에 대한 연구
- 모든 공학분야의 기초 원리에 대한 이론과 응용 및 공학적 기술이 융합된 종합 학문



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최근 7년간 세계에서 인용이 많이 된 **한국인 논문 수 순위** (괄호 안은 실제 논문수)

분야명	2005	2006	2007	2008	2009	2010	2011
재료과학	11(191)	14(170)	13(226)	10(263)	11(263)	9(304)	8(338)
화학	15(174)	15(178)	15(183)	12(265)	14(258)	12(298)	11(362)
물리학	13(275)	15(244)	15(267)	15(291)	15(277)	16(272)	14(339)
약학/독성학	15(88)	15(90)	15(79)	15(87)	15(89)	14(130)	14(126)
식물/동물공학	16(82)	16(84)	15(101)	16(96)	15(129)	15(65)	15(143)
수학	16(30)	16(42)	17(36)	16(43)	17(47)	15(65)	15(68)
환경/생태학	18(57)	17(57)	18(63)	19(65)	16(75)	16(105)	16(111)

한국연구재단제공 2012.8



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## 최근 7년간 세계 고피인용 논문 중 한국인 저자의 점유율(%)

분야명	2005	2006	2007	2008	2009	2010	2011
재료과학	2.6	2.3	2.8	3.2	3.3	3.7	4.4
화학	2.6	2.4	2.7	2.8	2.7	2.8	3.4
물리학	1.6	1.7	1.7	2.4	2.3	2.6	3.1
약학/독성학	1.7	1.8	1.6	1.7	1.7	2.5	2.5
식물/동물공학	1.3	1.3	1.6	1.5	1.9	2.2	2.1
수학	0.9	1.2	1.0	1.1	1.2	1.6	1.8
환경/생태학	0.9	0.9	1.0	1.1	1.2	1.7	1.8

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## ASTM(*A*merica *S*ociety for *T*esting and *M*aterials)

- 미국재료시험학회를 말하며 지구상에 생산되는 모든 제품의 재질의 실험을 통한 실험 데이터를 제공
- 1898년 설립, Philadelphia에 본부 소재
- 140개의 Committee와 36,000여 명의 회원으로 구성



## ASTM의 설립 목적

- 제품의 용도 및 특성을 시험
- 재료의 품질을 규격화
- 제조/연구, 이용자가 보다 좋은 재료를 선택, 사용





# ASTM Research Area

## 초고장력강판(UHSS)

최근 자동차 업계에서 보다 안전하고 가벼운 차체를  
만들기 위해 연구 및 적용

ASTM A1011 / ASTM A1011M



## 아라미드 섬유

기존의 섬유보다 무게는 가볍고 강도는 10배 강화  
된 꿈의 신소재

ASTM D2714-010



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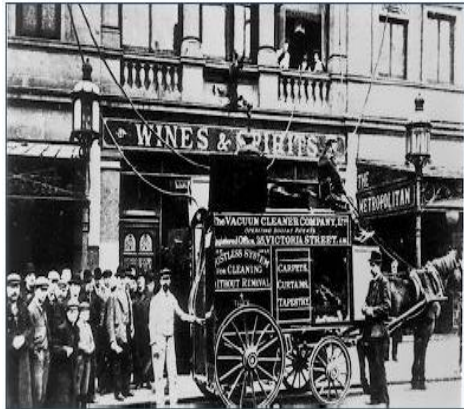
# ASTM Research Area

## ASTM 장난감 안전 기준

장난감에 대한 요구 사항, 재료 사용 제한, 라벨링  
요구사항, 테스트 방법 등에 대한 기준 ASTM  
F963-07



모든 규격들의 기본인 **ASTM**, 우리 생활과 항상 함께 하고 있습니다.



## ASTM 가전제품 안전기준

진공 청소기 본연의 기능이며 핵심기술인 집진 능력  
에 대한 기술 표준

ASTM F431



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놀이기구인 '에어 바운스'가 주저앉아 어린이 1명이 사망한 인천 송도컨벤시아 키즈파크가 무허가 영업을 해온 것으로 드러났습니다.

인천경제자유구역청은 지난달부터 인천도시공사와 임대계약을 맺고 영업을 시작한 문영업체가 놀이기구 안전성 검사 결과를 첨부해 영업허가를 신청한 사실이 없다고 밝혔습니다.

인천경제청은 이 업체의 영업이 불법이기 때문에 경찰에 고발할 방침입니다.

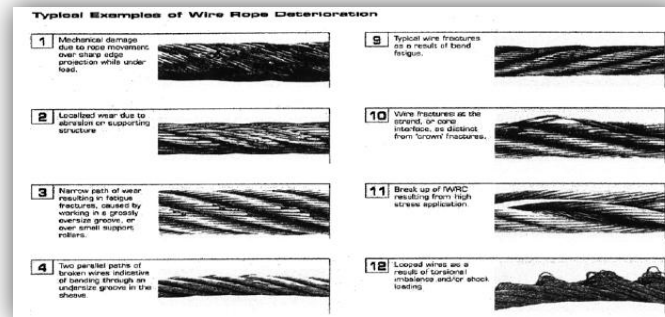
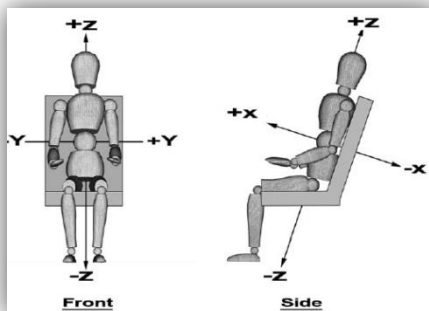
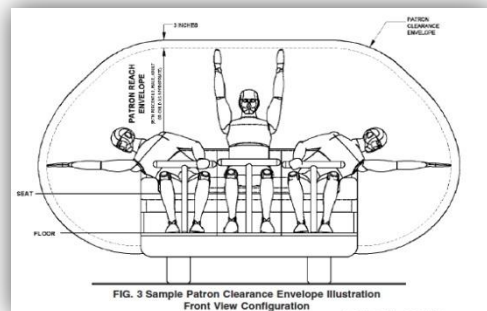


## ASTM D 2373

Standard Practice for Design, Manufacture, Operation, and Maintenance of Inflatable Amusement Devices<sup>1</sup>

## ASTM F 2291

Standard Practice for Design of Amusement Rides and Devices<sup>1</sup>





## ➤ 에너지/환경 표준

- 탄소배출량을 줄이기 위한 에너지 관련정책 집중
- 미국 환경보호국(EPA)은 ASTM 표준을 이용하여 온실가스 배출량 규칙제정

## ➤ 태양광 에너지 관련 표준

- 에너지의 독립성 및 환경을 위한 대체에너지에 대한 관심고조
- ASTM E44(태양광) 위원회 : 대체 에너지 관련 표준 진행
- ASTM E60(지속가능성) 위원회 : 건물의 환경, 경제적 측면을 다루는 표준개발

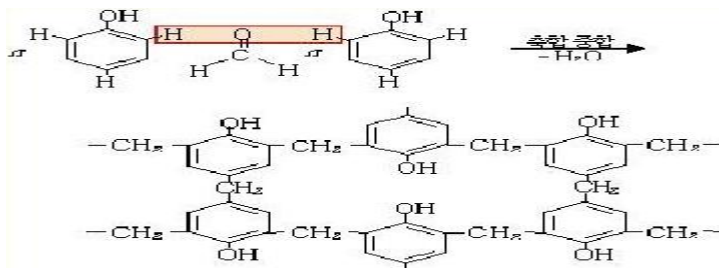


## ➤ 화합물 및 시험방법 표준

- D30(화합물) 위원회 : 다양한 화합물 표준 개발
- E07(비파괴시험) 위원회 : 방사선, 초음파관련 표준관리
- E13(분자분광학) 위원회 : 방사능, 원자력 관련 표준 연구

## ➤ 바이오 연료 – 에탄올 표준

- D02(석유제품/윤활유) 위원회 : 에탄올 작업 관련 표준 개발
- E48(바이오매스) 위원회 : 목재에서 추출된 바이오 연료 연구



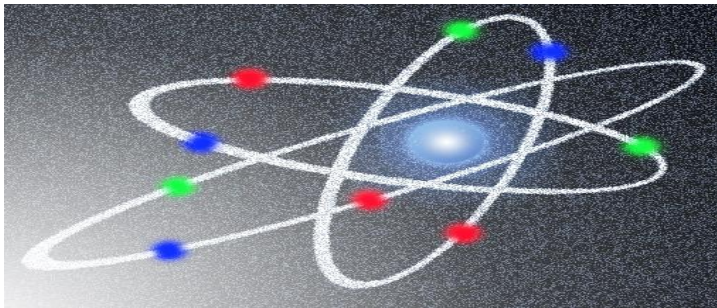
# ASTM Research Area

## ➤ 기후변화

- 기후변화 문제는 과학계와 산업계가 깊이 관여
- E50(환경평가) 위원회 : 기후변화 관련 가이드 제공

## ➤ 원자력 에너지

- E10(원자력기술) 위원회 : 에너지원의 안전한 응용기술 표준에 주력
- C26(원자력연료주기) 위원회 : 핵연료주기 프로세스 관리
- D33(원자력발전시설) 위원회 : 발전시설에 사용되는 보호막과 관련된 주제관리



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- 370여 개의 규격개발기관(SDO : Standard Development Organizations)에서 발행되는 산업기술 규격 INDEX 통합 검색
- 빠른 Update를 통한 최신 기술 자료 습득
- 빠르고 쉬운 검색
- 다양한 필터 기능으로 검색 속도 향상



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Documents: 1 - 20 of 16,087 Results Per Page: 20 1 2 3 4 Next >

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#	Document Number	Status	Date	Title	Tools
1.	<a href="#">Request</a> <b>AATCC ASTM METHODS</b> <a href="#">Details</a>   <a href="#">History</a>	Active	1992.01.01	A Summary of ASTM Methods for Interlaboratory Testing	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
2.	<a href="#">Request</a> <b>ASTM 00.01</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.11.01	Subject Index; Alphanumeric Index	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
3.	<a href="#">Request</a> <b>ASTM 00.01 CD</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.11.01	Subject Index; Alphanumeric Index	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
4.	<a href="#">Request</a> <b>ASTM 01.01</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Steel-Piping, Tubing, Fittings	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
5.	<a href="#">Request</a> <b>ASTM 01.01 CD</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Steel-Piping, Tubing, Fittings	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
6.	<a href="#">Request</a> <b>ASTM 01.02</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Ferrous Castings; Ferroalloys	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
7.	<a href="#">Request</a> <b>ASTM 01.02 CD</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Ferrous Castings; Ferroalloys	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
8.	<a href="#">Request</a> <b>ASTM 01.03</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2009.02.01	Steel-Plate, Sheet, Strip, Wire; Stainless Steel Bar	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
9.	<a href="#">Request</a> <b>ASTM 01.03 CD</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2009.02.01	Steel-Plate, Sheet, Strip, Wire; Stainless Steel Bar	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
10.	<a href="#">Request</a> <b>ASTM 01.04</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Steel-Structural, Reinforcing, Pressure Vessel, Railway	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
11.	<a href="#">Request</a> <b>ASTM 01.04 CD</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Steel-Structural, Reinforcing, Pressure Vessel, Railway	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
12.	<a href="#">Request</a> <b>ASTM 01.05</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Steel-Bars, Forgings, Bearing, Chain, Tool	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>
13.	<a href="#">Request</a> <b>ASTM 01.05 CD</b> <a href="#">Details</a>   <a href="#">History</a>	Active	2010.01.01	Steel-Bars, Forgings, Bearing, Chain, Tool	<a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a>

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1.	<a href="#">View</a> <b>ASTM F1932/F1932M</b> <a href="#">Redline</a> <a href="#">Details</a> <a href="#">History</a>	Revised	11/01/2013 (R 2011) (E 2013)	Standard Test Methods of Sampling and Testing Turpentine ANSI Approved	<a href="#">Select Multiple Documents</a> <a href="#">Favorites (Add)</a> <a href="#">Watch List (Add)</a> <a href="#">Goldfire »</a>

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2	View	ASTM F1932	11/01/2013	(R 2011) (E 2013)		Standard Test Methods of Sampling and Testing Turpentine	Revised
3	View	ASTM 00.01	11/01/2013		English	Subject Index	Active
4	View	ASTM 00.01	11/01/2012		English	Subject Index	Revised
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7	Request	ASTM 00.01	11/01/2009		English	Subject Index	Revised
8	Request	ASTM 00.01	11/01/2008		English	Subject Index	Revised
9	Request	ASTM 00.01	11/01/2007		English	Subject Index	Revised
10	Request	ASTM 00.01	11/01/2006		English	Subject Index	Revised



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1. **ASTM F431 입력**

#	Document Number	Status	Title
1.	ASTM F431	Active	Standard Specification for Air Performance Measurement Plenum Chamber for Vacuum Cleaners (R 2013)
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3.	ASTM F431	Revised	Standard Specification for Air Performance Measurement Plenum Chamber for Vacuum Cleaners
4.	ASTM F431	Revised	Standard Specification for Air Performance Measurement Plenum Chamber for Vacuum Cleaners
5.	ASTM F431	Revised	Standard Specification for Air Performance Measurement Plenum Chamber for Vacuum Cleaners
6.	ASTM F431	Revised	Standard Specification for Air Performance Measurement Plenum Chamber for Vacuum Cleaners
7.	ASTM F431	Revised	Standard Specification for Air Performance Measurement Plenum Chamber for Vacuum Cleaners (R 1992) (E 1992)
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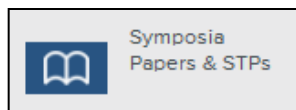
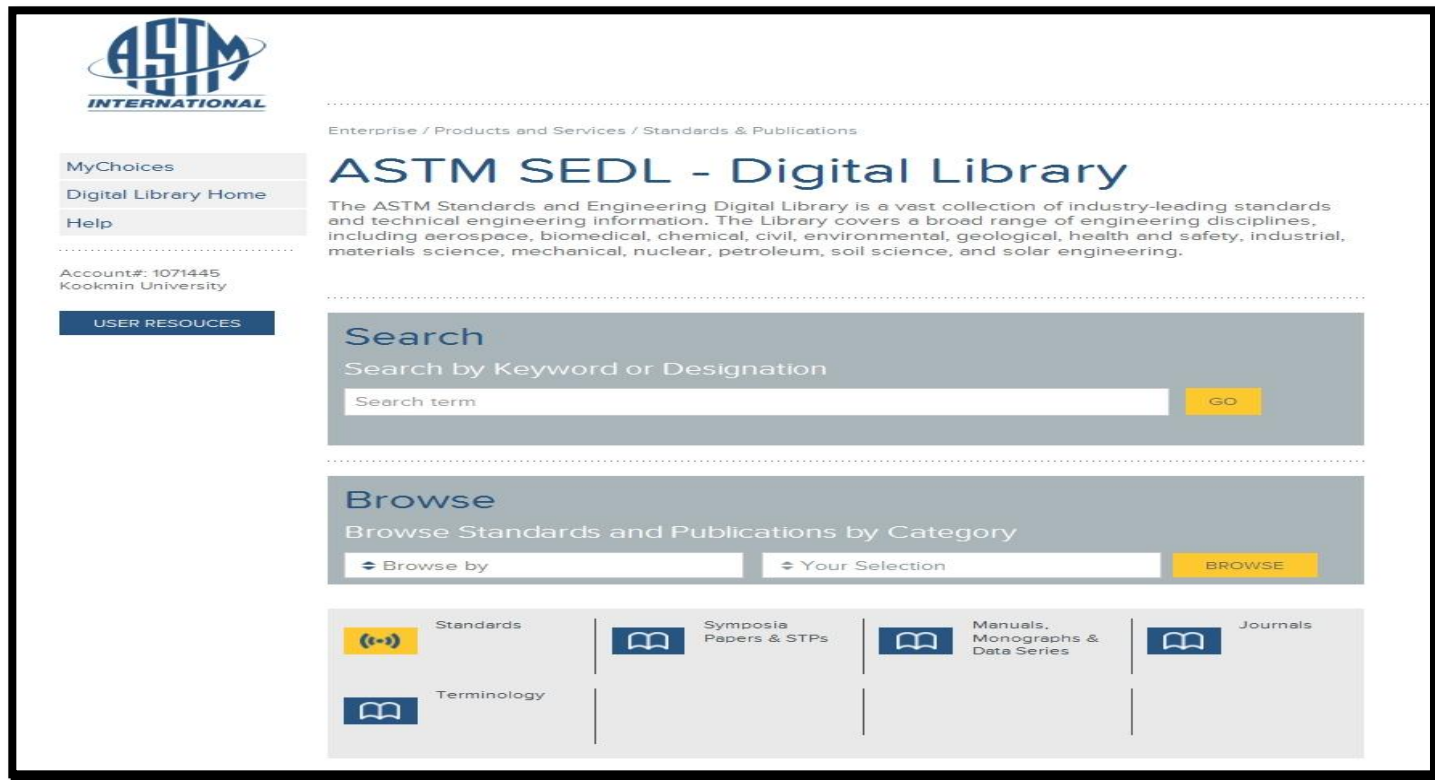
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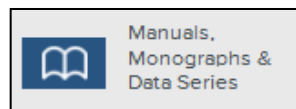
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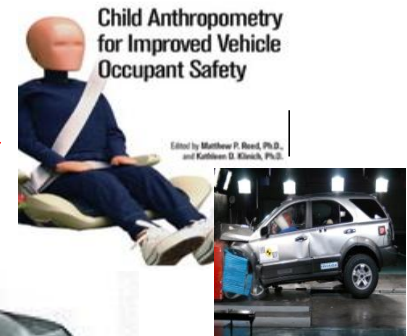
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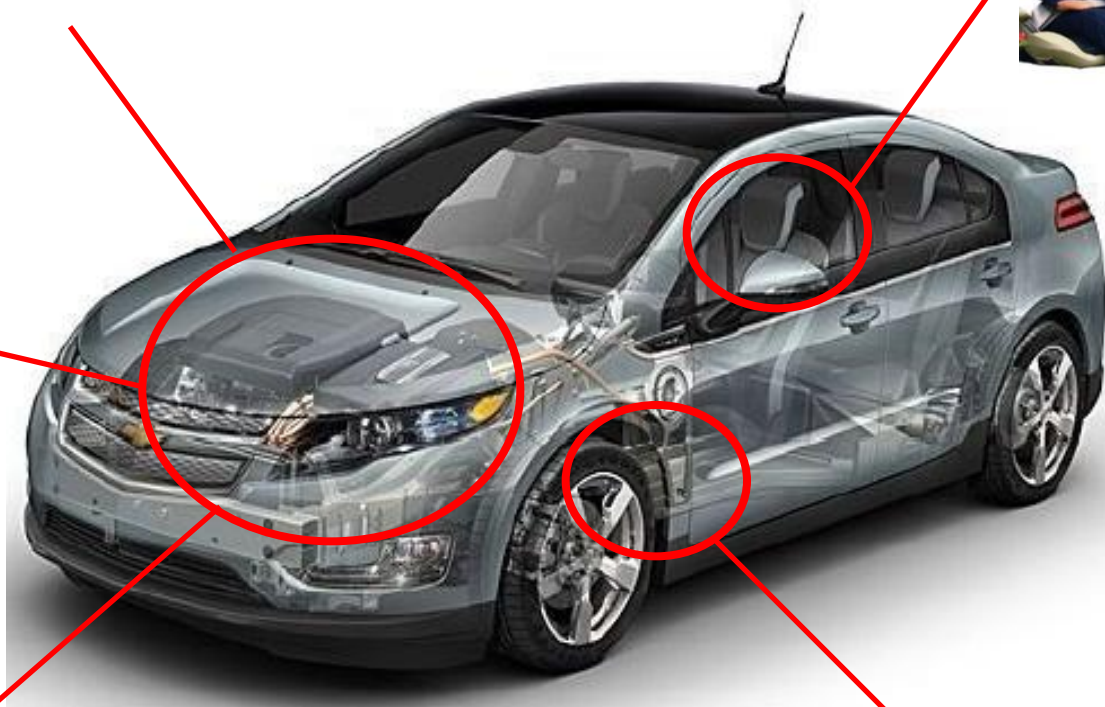
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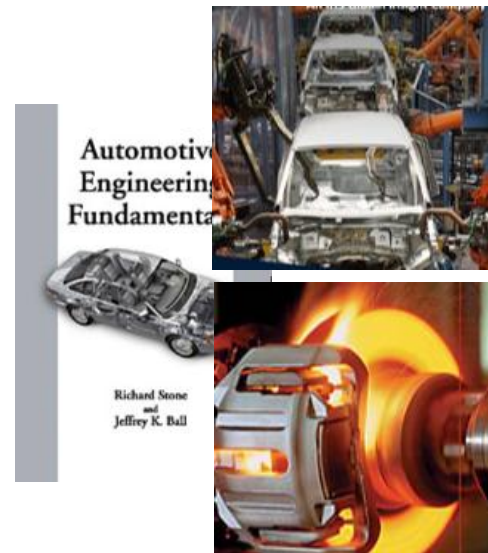
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# Olev (On-line Electric Vehicle)

- 2013년 세계 10대 유망기술 (세계 경제포럼)
- 도로 위에서 실시간으로 배터리 충전
- 기존 전기자동차의 단점을 보완할 수 있는 기술적용



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# KAIST Wireless Electric Vehicles - OLEV

Jin Huh<sup>1)</sup> Chun-Taek Rim<sup>2)</sup>

<sup>1)</sup> Dept. of Electrical Engineering, KAIST  
291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea (E-mail: hh221@kaist.ac.kr)

<sup>2)</sup> Dept. of Quantum and Nuclear Engineering, KAIST  
291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea

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**ABSTRACT.** In order to minimize the greenhouse effect due to the emission of CO<sub>2</sub>, automobile manufactures have been developing battery-powered plug-in automobiles with re-chargeable Lithium Polymer batteries. However, these pure electric vehicles (EVs) are not welcomed in the market because the Lithium batteries are heavy and still expensive with limited rechargeable cycles. Furthermore, charging time and relatively short driving range obstruct the commercialization of EVs. To solve the problems, KAIST proposed four generations of On-Line Electric Vehicles (OLEVs), a sort of roadway wireless powered EVs. This paper summarizes the progress of the OLEV developments. Four generations of OLEV were demonstrated for different underground electric power rails and pick-ups. The air-gap of the 1st generation OLEV car is 1 cm and the input to output power efficiency is 80 % with 3 kW output power. The ultra slim U-type mono rail applied to the 2nd generation OLEV bus gives 52 kW output power with 72 % efficiency at 17 cm air-gap. The ultra slim W-type dual rail applied to the 3rd generation OLEV sports utility vehicle delivers 15 kW/pick-up power with 71 % efficiency at 17 cm air-gap, which has recently been improved to 83 % at 20 cm air-gap for an OLEV bus, and 74 % efficiency at 12 cm air-gap for an OLEV train, respectively. The 4th generation of OLEV bus is under development, which has very narrow I-type underground power rails and compact high power pick-ups with drastically reduced electro-magnetic field (EMF), lower construction cost, small installation time, and enhanced lateral displacement. Throughout the development of OLEV, it has been that low cost EV without high reliance on batteries with sufficiently high power capacity, efficiency, and air-gap is

Table1. KAIST OLEV



















	1 G (Car)	2 G (Bus)	3 G (SUV)	3+ G (Bus)	3+ G (Train)	4 G (Bus)
Date	Feb. 27, 2009	July 14, 2009	Aug. 14, 2009	Jan. 31, 2010	Mar. 9, 2010	2010~(development)
Vehicle						
System Spec	air-gap= 1cm efficiency= 80%	air-gap= 17cm efficiency= 72%	air-gap= 17cm efficiency= 71%	air-gap= 20cm efficiency= 83%	air-gap= 12cm efficiency= 74%	air-gap= 20cm efficiency= 80%
EMF	10mG	51mG	50mG	50mG	50mG	<10mG
Power Rail (width)	 20cm	 140cm	 80cm	 80cm	 80cm	 10cm
Pick-up (power)	 3kW / pick-up 20kg	 6kW / pick-up 80kg	 15kW / pick-up 110kg	 15kW / pick-up 110kg	 15kW / pick-up 110kg	 (25kW / pick-up) (80kg)
	55x18x4 cm <sup>3</sup>	160x60x11 cm <sup>3</sup>	170x80x8 cm <sup>3</sup>	170x80x8 cm <sup>3</sup>	170x80x8 cm <sup>3</sup>	(80x100x8 cm <sup>3</sup> )



Fig. 1 The concept of the OLEV system

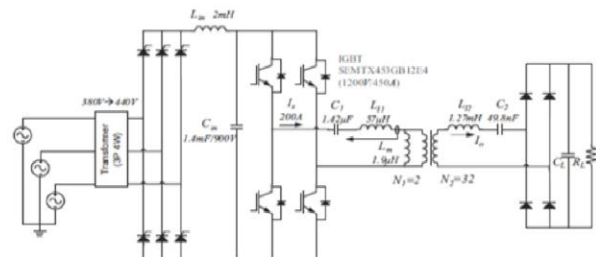


Fig. 2 System diagram of the IPTS for OLEV



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**2. Search:** This section is located at the top right of the interface. It includes a 'Quick Search' button, a 'Search Results' tab, a 'Searched:' input field, a 'Limit to Full Text' checkbox, an 'Include Historical Standards' checkbox, a 'My:' dropdown menu (Technical Papers 1998 - Present), a 'Sort By:' dropdown menu (Relevance, Title, Date, Item #), and a 'Displaying:' dropdown menu (25).

**3. Result:** This section is located on the right side of the interface. It displays a list of search results, including the title, author, and number of each paper. The results are: 'Stress-Accelerated Photodegradation of Space-Rated Flexible Transparent Films Exposed to Mars Surface UV' (J. M. Clawson, A. Hoehn, Number: 2005-01-2775), 'The USAMP Magnesium Powertrain Cast Components Project' (Joy A. Hines, Robert C. McCune, John E. Allison, Bob R. Powell, Larry J. Ouimet, William L. Miller, Randy Beals, Lawrence Kopka, Peter P. Ried, Number: 2006-01-0522), 'Subscale Testbed for Characterizing Regenerable Adsorbents used in Air Revitalization of Spacecraft Atmospheres' (Oscar Monje, Peter R. Kenny, Nickolas A. Sexson, Brid Brosnan, Raymond M. Wheeler, Number: 2009-01-2526), and 'Light Turbocharger Compressor Wheels from Aluminium and Magnesium Investment Casting'.

1. Filter

2. Search

3. Result



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**Author(s):** J. M. Clawson - University of Colorado, Boulder; A. H.

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**Citation:**  
Clawson, J. and Hoehn, A., "Stress-Accelerated Photodegradation of Films Exposed to Mars Surface UV," SAE Technical Paper 2005-01-2775

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**Abstract:**  
Thin films continue to play an ever-increasing role in high performance systems. Membrane structures have been developed or envisioned for such applications as radiometers, radars, concentrators, telescopes, sun shields, solar habitats. Inflatable membrane structures can have very high packing efficiency and be lightweight because pressure differences provide structural stability. Recent proposals have suggested construction of an inflatable greenhouse for Mars. This paper reports on the progress to examine the effects of mechanical and chemical degradation on polymer films exposed to simulated Mars ultraviolet radiation. [View Full Text](#)

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9. Li, T., O'Donnell B., et al. (1994). Deformation and fracture of polypropylene exposed to ultraviolet irradiation under stress. Institute of Materials (UK), 1994.

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**Taxonomy Terms:**

Environment Polymers

**Paper Presented At:** 35th International Conference on

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This journal focuses on publishing the aim of the journal is to provide state-of-the-art techniques for automotive and aerospace research and application areas include Polymers, Casting, Stamping, Forming, etc.  
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**Mechanical Properties of Polymer Composites Used in Oxidizing Environments: A Review**  
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# SAE Digital Library – Search Results (Standard)

**J312**Latest Version◀ Previous | Next ▶

**Automotive Gasolines**

**Status:** Revised

**Published:** 2010-11-05

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**Content Type:** Ground Vehicle Standard

Print

**Publisher:** SAE International

**Language:** English

**Issuing Committee:** Fuels and Lubricants TC 7 Fuels

**Scope:**

This SAE Recommended Practice summarizes the composition of modern automotive gasolines, the significance of their physical and chemical characteristics, and the pertinent test methods for defining or evaluating these properties.

**Latest & Historical Versions of this Standard:**

Standard	Browse	Published	Revision	Status
<b>J312_201011</b>	Viewing	2010-11-05	Latest	Revised ?
↳ J312_200102	View	2001-02-01	Historical	Revised ?
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↳ J312_199705	View	1997-05-01	Historical	Revised ?
↳ J312_199301	View	1993-01-01	Historical	Revised ?

**Taxonomy Terms:**

Exhaust emissionsEvaporative emissions control systemsGasolineSpark ignition gasoline engines

**Cross References:**

ASTM D 1250ASTM D 1266ASTM D 1298ASTM D 130ASTM D 1391ASTM D 2622ASTM D 2699ASTM D 2700ASTM D 2885ASTM D 3120ASTM D 3231ASTM D 3237ASTM D 3338ASTM D 3828ASTM D 4052ASTM D 445ASTM D 471ASTM D 4806ASTM D 4809ASTM D 4814ASTM D 4815ASTM D 4953ASTM D 5059ASTM D 5188ASTM D 5190ASTM D 5191ASTM D 525ASTM D 5453ASTM D 5482ASTM D 5500ASTM D 5598ASTM D 5599ASTM D 56ASTM D 5797ASTM D 5798ASTM D 5845ASTM D 6378ASTM D 6593ASTM D 6709ASTM D 6837ASTM D 6920ASTM D 6984ASTM D 7039ASTM D 7320ASTM D 86ASTM E 659J1082\_200802J1297\_200707J1349\_201109J1498\_201112J1681\_200001J1829\_200210

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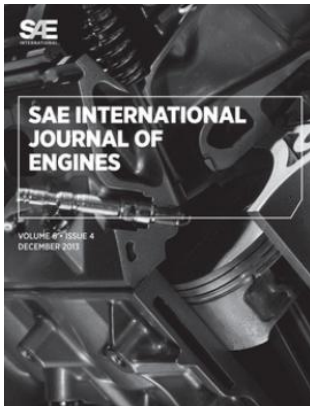
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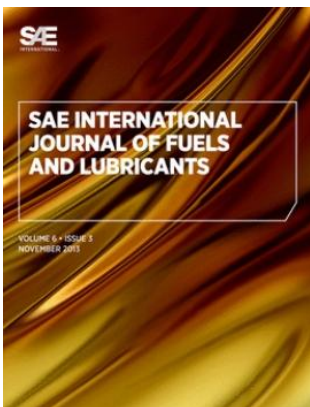
- on-road vehicle(트럭, 버스, SUV, 밴) 과 off-road vehicle(농업용 / 건설용 / 군용 / 무인 / 다목적 기계차량)과 관련된 연구논문 자료집.

## Journal of Engines



- 엔진분야에서 가장 권위 있고 심층적으로 분석한 연구 논문 자료집.

## Journal of Fuels and Lubricants



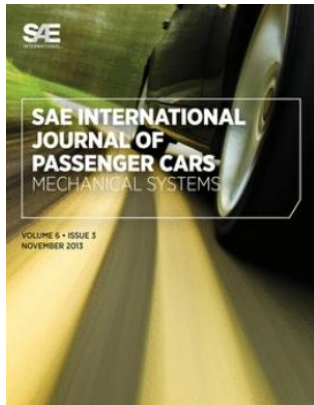
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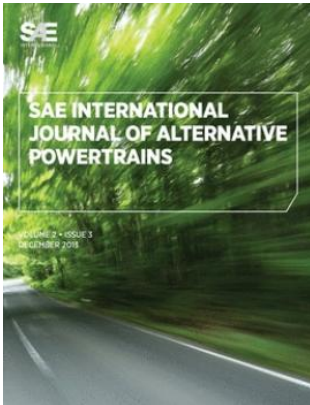
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## Journal of Alternative Powertrains



- Powertrain 및 추진기술에 대한 독창적인 논문자료집.

## Journal of Transportation Safety



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## [전문가 기고]자동차, 특허괴물과의 전쟁 대비를

### [AD] 중고를 알보지 마라! 중고는 전시물

우리나라 자동차 업체들을 타깃으로 한 미국 내 특허소송이 지난해에만 18건이 발생했다. 2010년부터 2012년까지 연간 10건 이하였던 것을 감안하면 급격한 증가세로, 글로벌 자동차 기업 전체에 대한 특허소송 평균 증가율을 크게 웃도는 높은 수치다.

우리나라 자동차 업체에 대한 특허소송은 주로 NPE(Non-Practicing Entity)라 불리는 특허괴물, 즉 특허소송 전문기업이 제기한 것으로 알려졌다. 특허괴물 중 우리 기업을 상대로 가장 많이 제소한 기업은 미국 텍사스에 소재한 아메리칸 비큘러 사이언스(American Vehicular Sciences)로, 총 8건을 냈다. 또 글로벌 자동차 업체와도 30여건의 특허소송을 진행하고 있다.



이런 NPE의 무분별한 특허소송에 대해 최근 공정거래위원회는 특허권 남용을 일삼는 NPE를 적극 규제하겠다고 발표했다. 미국 오바마 정부도 NPE를 '다른 사람의 아이디어를 가로채 돈을 뜯어낼 기회만 엿보는 존재'로 비판하고 의회와 함께 NPE 소송 남용을 억제하는 법안을 추진 중이다. 하지만 우리나라 기업들은 미국에서 특허기반이 취약한 만큼 NPE의 제소에 대응하기 위한 만반의 준비를 해야 한다.

자동차는 앞으로 고전적인 기계 장치에서 IT가 융합된 스마트카, 하이브리드카, 전기자동차 등과 같은 그린카로 발전할 것이다. 이 때문에 NPE의 특허소송도 스마트폰, 무선통신 등 IT 분야에서 수년 안에 스마트카와 그린카 등으로 확산될 것이라는 게 전문가들의 예상이다. 실제로 최근 3년간 현대·기아차에 대해 제기된 특허소송을 분석해보면 차량용 소프트웨어, 전자제어, 텔레매틱스, 차량용 프로세서 등인 것으로 나타났다.

## 현대·기아차, 안팎으로 복병... 한국 자동차 산업 위기

국내시장 수입차 잠식, 엔진경쟁력 주춤, 통상임금-노조문제 등 산적

현대자동차와 기아자동차는 올들어 11월까지 판매량이 각각 432만1137대, 258만2333대로 1년 전보다 7.7%, 3.3% 증가하며 사상 최대를 기록했다. 두 회사를 합해 올해 초 세운 741만대 판매목표를 초과달성하며 750만대를 넘길 것으로 예상되지만 넘어야 할 산도 적지 않다.

◇수입차 성장으로 안방 위협 = 우선 중국과 브라질 등 신흥시장에서 선전하며 글로벌 판매는 늘었지만 정작 안방에서 수입차에 계속 점유율을 내주는 게 우려스런 대목이다.

국내 완성차와 수입차를 포함하면 현대·기아차의 국내시장 점유율은 지난해말 74.9%에서 올들어 11월말 현재 72.3%로 2.6포인트 축소됐다. 반면 수입차 점유율은 8.5%에서 10.3%로 1.8포인트 뛰었다. 현대·기아차 점유율 하락폭의 상당부분을 수입차가 가져간 것이다.

◇엔진개발 주춤...연비개선도 과제 =미국 자동차 전문미디어 워즈오트가 지난 12일 발표한 '2014 세계 10대 엔진'에 현대차의 이름은 찾아볼 수 없었다. 2012년부터 3년 연속 제외됐다. 이 명단에 디젤과 터보차저엔진이 대거 포함됐지만 이 부문에서 현대차의 경쟁력이 높지 않았다는 의미다.

현대차는 2009년과 2010년 '에쿠스' '제네시스'에 들어간 4.6타우엔진, 2011년에는 '엑센트' '엘란트라'(아반떼) 'i20' 등에 장착되는 1.6ℓ 감마 DOHC I4엔진이 뽑혔다. 현대차는 2008년을 전후해 가솔린 다운사이징과 하이브리드, 플러그인, 전기차 등 거의 모든 연비관련 기술을 개발하며 세계시장에서 두각을 나타내다 소강상태에 접어들었다.

2014년 1월 6일 etnews  
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